

# PATENT SPECIFICATION

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## (54) DEVICE FOR FOLDING STRIP MATERIAL

(71) We, G. D. SOCIETA' PER AZIONI, an Italian Company of Via Pomponia 10, Bologna, Italy, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to devices for longitudinally folding moving strip material in bellows fashion. Such devices have particular use in machines for wrapping confectionery products for example.

A known wrapping presentation for parallelepiped shaped confectionery products uses two wraps, an inner wrap and an outer wrap, the materials for which are supplied superposed over each other and are contemporaneously folded onto the product by the wrapping mechanism.

Cuttings of a width identical to or less than that of the product are used for the inner wrap which enshrouds four of the six faces of the product in the form of a tube.

The outer wrap is supplied in cuttings of similar length as the inner wrap but the width of said cuttings is greater than that of the inner wrap cuttings so that once the wrapping is completed, in addition to covering said four sides, it also covers the two sides of the product left exposed by the inner wrap.

Both said cuttings are normally obtained in a single operation involving the cutting of webs provided from two separate reels. A second pair of reels generally serves for reserve purposes.

A type of presentation for the same kind of products is also known which differs from the former inasmuch as it contains a picture (for example, one of a set or else a picture of a publicity nature) interposed between the outer wrap and the product itself, in place of the aforementioned ordinary inner wrap.

When this second type of presentation is used, in order to allow for the interposition of a picture covering a relatively large area, the pictures are wound onto the products from a web which has been subjected to a preliminary longitudinal folding operation.

Also, when the second type of presentation is used, the known technique uses a single reel of material (with a second reel serving for reserve purposes), out of which are obtained in one longitudinal cutting operation, both the strip material to be used for the cutting for the outer wrap and the wider material onto which the illustrations are printed in succession.

After the longitudinal cutting operation, the wider material is guided by transmission means in such a way as to cause it to be drawn close to the narrower material and to be superposed thereover, so that a single cutting device operating in a transverse direction can contemporaneously cut the two superposed strips.

Photo sensitive means that work in conjunction with the two strips of wrapping material attend to controlling and regulating the centering of both strips with respect to the cutting device.

With particular reference to the operation of longitudinally folding the material onto which the illustrations are printed in succession, let it now be assumed that said strip has to be folded into at least three superposed parts in bellows fashion so as to limit its width to a value less than that or identical to that of the width of the product, as already described concerning the ordinary type of inner wrap.

The folding operation is achieved in the known art by a plurality of fixed plates which are arranged at different angles along the path followed by the material to manoeuvre it progressively to be folded into three or more folds superposed over

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one another whilst, at the same time, the edges of the fixed plates come into contact with the longitudinal lines of the wrapping material to form its fold lines. With devices of this type the material is subjected to high friction stress where it comes into contact with the fixed plates and this can seriously impair its quality.

Then again when taking into consideration the fact that the wrapping material used is often of the waxed variety, that is to say that it is rendered greaseproof by a film of wax being spread across its surface, the friction action on the part of the fixed plates scrapes the film of wax which results in wax dropping down into the mechanism of the machine below and in the loss of the greaseproofing properties of the material.

An object of the present invention is, therefore, to overcome the aforementioned difficulties.

According to the present invention there is provided a device for longitudinally folding moving strip material in bellows fashion, said device comprising a plurality of pairs of rotatable folding members spaced apart along a straight path, the two members of each pair being disposed on opposite sides of said path and being rotatable about fixed parallel axes transverse to said path to contact opposite faces of the strip material when the strip is advanced longitudinally along said path, each pair of members imparting zig-zag folds to the moving strip and the pitch of the zig-zag decreasing progressively as the strip passes between successive pairs of members, and means downstream of the folding members for urging the folds into contact with one another.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, in which:

Fig. 1 is a diagrammatic perspective view of a device according to the invention; and

Fig. 2 is a diagrammatic front view of the device with the roller pairs seen in top plan view.

With reference to the drawings, fig. 1 shows a composite web 1 coming in a known fashion from a single reel not shown in either figure. The web 1 is cut longitudinally into two strips 1a and 1b by a continuous disc type knife 2 working in conjunction with a counter roller 3 as is the usual practice in the specific field of feeding these particular wrapping materials.

The strip 1a is destined to constitute the outer wrap and on the face of the material that faces outwards once the wrap has been completed, a given design shown in Fig. 1 and numbered 1c is carried.

The strip 1b, which is wider than the strip 1a is destined, after it has been folded longitudinally, to constitute the inner wrap and on its face 1d there are illustrations not depicted in either figure.

The strip 1b is passed under and over the rollers 4 and 5, respectively, after which it is guided initially between a first pair of rollers 6 and 7 and then between a second pair of rollers 8 and 9.

The rollers in both the pair 6-7 and in the pair 8-9 have complementary rolling surfaces, each roller comprising three alternately axially oppositely directed truncated cones with the generatrices of at least the intermediate cones 6a-7a and 8a-9a of a length substantially equal to the width of the intermediate longitudinal fold 1e it is wished to create in the strip.

As the shaped rollers in each pair 6-7 and 8-9 close on the strip 1b they co-operate with one another and since the cone angle (i.e. the angle at the apex of each cone) in the pair of rollers 8-9 is greater than that in the pair of rollers 6-7 (see Fig. 2 in which the rollers 6 and 8 are depicted for purposes of illustration only) rotated through 90° with respect to the rollers with which they are paired, that is to say, roller 7 and roller 9, respectively), when the strip 1b is passed first between the rollers 6-7, it is gradually compelled to take on a crosswise obtuse-angled zig-zag corrugation and then, when passing between the rollers in the pair 8-9, to be provided more noticeably with three acute-angled zig-zag longitudinal folds, namely 1e-1f-1g, which gradually approach one another as the strip moves towards a pair of guide rollers 10-11. As the strip passes between rollers 10, 11 it is gripped tightly and the zig-zag folds are urged into contact with one another to provide a folded bellows ready to be carried towards the strip 1a and to be superposed thereover with the aid of transmission rollers 12-13-14. Subsequently the composite strip is taken to the cutting device so that it can be cut into pieces to be supplied to the wrapping machine in the customary manner.

The rollers in the pairs of rollers 6-7 and 8-9 are rotatably supported on spindles 6'-7' and 8'-9', respectively, in a way which either allows them to idle thereon or else to be driven to advance the strip while folding it.

#### WHAT WE CLAIM IS:—

1. A device for longitudinally folding moving strip material in bellows fashion, said device comprising a plurality of pairs of rotatable folding members spaced apart along a straight path, the two members of each pair being disposed on opposite sides of said path and being rotatable about fixed parallel axes transverse to said path

to contact opposite faces of the strip material when the strip is advanced longitudinally along said path, each pair of members imparting zig-zag folds to the moving strip and the pitch of the zig-zag decreasing progressively as the strip passes between successive pairs of members, and means downstream of the folding members for urging the folds into contact with one another.

2. A device as claimed in claim 1 wherein the pairs of folding members include a first pair which impart a number of obtuse-angled primary zig-zag folds to said strip and a second pair downstream from the first pair which compress the obtuse-angled primary folds to form the same number of acute-angled secondary folds.

3. A device as claimed in claim 2 wherein the two members of each pair comprise two rollers having complementary rolling surfaces, each said roller comprising a plurality of alternately axially oppositely directed truncated cones, the generatrix of each of an intermediate pair of complementary truncated cones of the two rollers of each pair being of a length substantially equal to the width of a corresponding intermediate longitudinal fold to be created in the moving strip material, and the cone angles being greater in the

second roller pair than in the first roller pair.

4. A device as claimed in any one of claims 1 to 3 wherein said rotatable members are rotatably mounted in a manner permitting them to idle.

5. A device as claimed in any one of claims 1 to 3 wherein said rotatable members are driven to advance the strip along said path while folding the strip.

6. Apparatus for supplying a wrapping machine with superposed pieces of wrapping material, a first piece being folded longitudinally in bellows fashion to become an inner wrap on a product, and a second piece to become an outer wrap, said apparatus comprising a device as claimed in any one of claims 1 to 5 and transmission means arranged to receive a folded first strip and to superpose the folded strip against a second strip of wrapping material.

7. A device for longitudinally folding moving strip material in bellows fashion, said device being substantially as described herein with references to the accompanying drawings.

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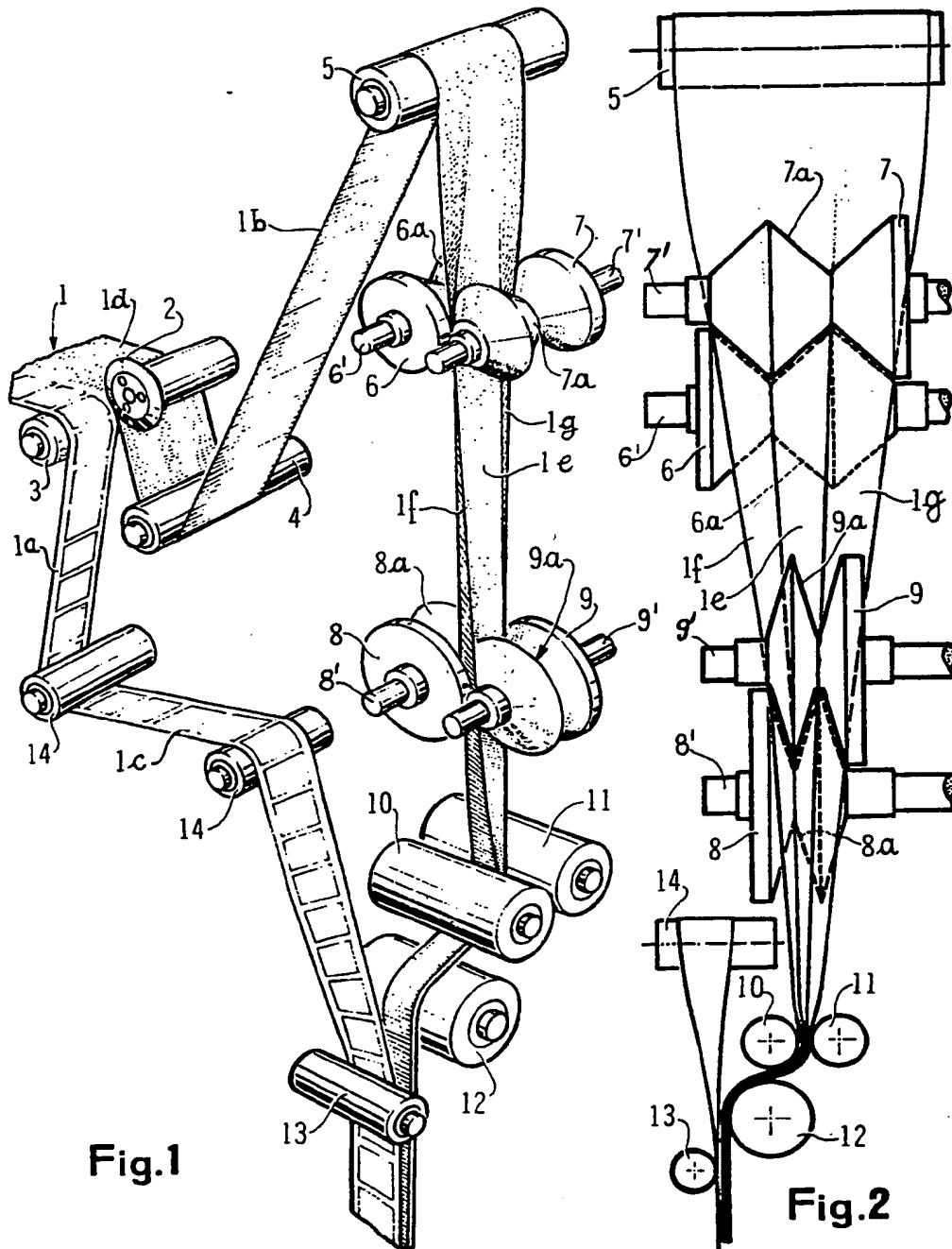


Fig.1

Fig.2